

What is claimed is:

1. A method for providing traffic information, the method comprising:

for each segment of a route between an origin point and a destination point,
performing a time-dependent journey planning calculation, based on a time during
5 which a vehicle is predicted to be travelling through the segment, to produce a
segment result;

forming at least one route result, the at least one route result being formed
based on a plurality of the segment results;

storing the at least one route result in a digital storage means; and

10 accessing the rapid access means for use in responding to a user request for
traffic information for a journey between the origin point and the destination point.

2. A method according to claim 1, wherein performing the time-dependent journey
planning calculation for each segment comprises determining a segment duration for
15 traversing the segment based on a predicted vehicle speed for the segment at the time
during which the vehicle is predicted to be travelling through the segment.

3. A method according to claim 2, wherein forming the at least one route result
comprises summing a plurality of segment durations to produce an overall route
20 duration.

4. A method according to claim 1, wherein performing the time-dependent journey
planning calculation for each segment comprises determining a predicted vehicle
speed for traversing the segment based on the time during which the vehicle is
25 predicted to be travelling through the segment.

5. A method according to claim 4, wherein forming the at least one route result
comprises averaging a plurality of predicted vehicle speeds, each corresponding to a
segment, to produce an overall predicted route speed.

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6. A method according to claim 1, wherein performing the time-dependent journey
planning calculation is based on a time of day and a day of the week during which the
vehicle is predicted to be travelling through the segment.

7. A method according to claim 6, wherein the day of the week is selected from a group comprising Bank Holiday, Day before Bank Holiday, Day after Bank Holiday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday.

5 8. A method for providing traffic information, the method comprising:
pre-determining at least a portion of a recommended most economic route between an origin point and a destination point;
storing the pre-determined portion of the recommended most economic route in a rapid access means in a digital storage means; and
10 accessing the rapid access means for use in responding to a user request for traffic information for a journey between the origin point and the destination point.

9. A method according to claim 8, wherein the pre-determined portion of the recommended most economic route comprises a route between a first network
15 decision node, for the origin point, and a second network decision node, for the destination point;
and wherein the first and second network decision nodes are nodes, of a network of digital map nodes, that correspond to key transportation links.

20 10. A method according to claim 8, wherein the rapid access means comprises a look-up table.

11. A method according to claim 8, wherein pre-determining at least a portion of the recommended most economic route comprises determining a shortest time route
25 between the origin point and the destination point.

12. A method according to claim 8 or 11, wherein pre-determining at least a portion of the recommended most economic route comprises determining a shortest distance route between the origin point and the destination point.
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13. A method for providing traffic information, the method comprising:
determining, with reference to a first network of geographical boundaries and a second network of digital map nodes, a recommended most economic route between an origin point and a destination point; and

transmitting the recommended most economic route to a user.

14. A method according to claim 13, wherein the recommended most economic route is further determined by determining: a set of local decision nodes comprising a first
5 local decision node, for the origin point, and a second local decision node, for the destination point; and a set of network decision nodes comprising a first network decision node, for the origin point, and a second network decision node, for the destination point;

10 wherein the set of local decision nodes corresponds to links on the second network, and the set of network decision nodes corresponds to key transportation links on the second network;

and wherein the origin point and destination point are specified with reference to geographical boundaries on the first network.

15 15. A method according to claim 13, wherein the geographical boundaries comprise a set of postcodes.

16. A method according to claim 13, wherein the recommended most economic route minimises a journey distance between the origin point and the destination point.

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17. A method according to claim 13 or 16, wherein the recommended most economic route minimises a journey time between the origin point and the destination point.

25 18. A method according to claim 13, wherein the recommended most economic route minimises a journey cost between the origin point and the destination point.

19. A method according to claim 14, wherein the set of network decision nodes comprises further network decision nodes in addition to the first and second network decision nodes.

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20. A method according to claim 14, wherein at least one of the origin point, the destination point, and a member of the set of local decision nodes is also a member of the set of network decision nodes.

21. A method according to claim 14, further comprising:

pre-determining at least a portion of the recommended most economic route,
the pre-determined portion comprising a route between the first network decision
node and the second network decision node;

5 storing the pre-determined portion in a rapid access means in a digital storage
medium; and

accessing the rapid access means for use in transmitting the recommended
most economic route to the user.

10 22. A method according to claim 21, wherein the rapid access means comprises a
look-up table.

23. A method according to claim 1, 9, or 14, further comprising:

receiving real time data relating to real time vehicle location from a plurality
15 of vehicle-bound probes; and

creating a matrix of vehicle speeds relative to at least a plurality of time of day
divisions and a plurality of routes, based on the real time vehicle location data.

24. A method according to claim 23, wherein the plurality of vehicle-bound probes
20 include at least one mobile telephone.

25. A method according to claim 23, further comprising:

creating a first matrix of recommended most economic routes relative to at
least a plurality of time of day divisions and a plurality of routes, based on the matrix
25 of vehicle speeds.

26. A method according to claim 25, further comprising, in creating the first matrix
of recommended most economic routes, removing outlier vehicle speeds, and vehicle
speeds related to unforecastable events, from the matrix of vehicle speeds using
30 statistical analysis.

27. A method according to claim 25, wherein the first matrix of recommended most
economic routes comprises a plurality of route matrix elements, each route matrix
element corresponding to a pairing of an origin point with a destination point, and

comprising: a route string, a shortest distance corresponding to the route string, a time corresponding to the route string, and a cost corresponding to the route string.

28. A method according to claim 27, wherein the route matrix elements further
5 comprise entries for a plurality of possible vehicle types.

29. A method according to claim 27, wherein each shortest distance string is determined by:

10 determining a first distance between the origin point and the first local decision node;
determining a second distance between the first local decision node and the first network decision node;
determining a third distance between the first network decision node and the second network decision node;
15 determining a fourth distance between the second network decision node and the second local decision node;
determining a fifth distance between the second local decision node and the destination node; and
20 summing the first distance, the second distance, the third distance, the fourth distance, and the fifth distance to produce the shortest distance string.

30. A method according to claim 29, wherein determining the third distance comprises summing a plurality of distances corresponding to distances between successive members of the set of network decision nodes, and wherein the set of
25 network decision nodes comprises further network decision nodes in addition to the first and second network decision nodes.

31. A method according to claim 25, further comprising:
30 identifying, in real time, an area of traffic congestion between the origin point and the destination point; and
determining an alternative, second matrix of recommended most economic routes based on the identified area of traffic congestion.

32. A method according to claim 31, wherein the area of traffic congestion is identified using both public domain data and non-public domain data.

33. A method according to claim 31, wherein the area of traffic congestion is
5 identified using a database of traffic patterns.

34. A method according to claim 31, wherein the area of traffic congestion is identified by determining whether real time vehicle location data from a plurality of vehicle-bound probes correspond to a pre-determined level of variance from historic
10 real time vehicle speeds.

35. A method according to claim 31, further comprising:
transmitting a message to a user identifying a cause of the area of traffic
congestion.

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36. A method according to claim 31, wherein the second recommended most economic route matrix is determined by determining a route having a shortest time between at least one pairing of origin point and destination point.

20 37. A method according to claim 36, further comprising calculating a forecast delay by comparing the shortest time on the second recommended most economic route matrix with a corresponding time from the first recommended most economic route matrix.

25 38. A method according to claim 29, further comprising transmitting traffic alert information to a user in real time, the transmission comprising at least one of: a traffic messaging channel on a radio data system; a message to a mobile telephone; or a display of data over the Internet.

30 39. A computer program product comprising program code means adapted to control the method of claim 1, 8, 13, or 14.

40. A system for providing traffic information, the system comprising:

a route segment processor for performing, for each segment of a route between an origin point and a destination point, a time-dependent journey planning calculation based on a time during which a vehicle is predicted to be travelling through the segment, to produce a segment result;

5 a route result formation means for forming at least one route result, the at least one route result being formed based on a plurality of the segment results;

a rapid access means, in a digital storage means, for storing the at least one route result; and

10 a user request processor for accessing the rapid access means for use in responding to a user request for traffic information for a journey between the origin point and the destination point.

41. A system according to claim 40, wherein the route segment processor comprises means for determining a segment duration for traversing each segment, based on a
15 predicted vehicle speed for the segment at the time during which the vehicle is predicted to be travelling through the segment.

42. A system according to claim 41, wherein the route result formation means comprises means for summing plurality of segment durations to produce an overall
20 route duration.

43. A system according to claim 40, wherein the route segment processor comprises means for determining a predicted vehicle speed for traversing the segment based on the time during which the vehicle is predicted to be travelling through the segment.
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44. A system according to claim 43, wherein the route result formation means comprises means for averaging a plurality of predicted vehicle speeds, each corresponding to a segment, to produce an overall predicted route speed.

30 45. A system according to claim 40, wherein the route segment processor comprises means for performing the time-dependent journey planning calculation based on a time of day and a day of the week during which the vehicle is predicted to be travelling through the segment.

46. A system according to claim 45, wherein the day of the week is selected from a group comprising Bank Holiday, Day before Bank Holiday, Day after Bank Holiday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday.

5 47. A system for providing traffic information, the system comprising:

a route pre-determination processor for pre-determining at least a portion of a recommended most economic route between an origin point and a destination point;

a rapid access means in a digital storage means, for storing the pre-determined portion of the recommended most economic route; and

10 a user request processor for accessing the rapid access means for use in responding to a user request for traffic information for a journey between the origin point and the destination point.

48. A system according to claim 47, wherein the pre-determined portion of the
15 recommended most economic route comprises a route between a first network decision node, for the origin point, and a second network decision node, for the destination point;

and wherein the first and second network decision nodes are nodes, of a network of digital map nodes, that correspond to key transportation links.

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49. A system according to claim 47, wherein the rapid access means comprises a look-up table.

50. A system according to claim 47, wherein the route pre-determination processor
25 comprises means for determining a shortest time route between the origin point and the destination point.

51. A system according to claim 47 or 50, wherein the route pre-determination
30 processor comprises means for determining a shortest distance route between the origin point and the destination point.

52. A system for providing traffic information, the system comprising:

a route determination processor for determining, with reference to a first network of geographical boundaries and a second network of digital map nodes, a

recommended most economic route between an origin point and a destination point;
and

a transmitter for transmitting the recommended most economic route to a user.

- 5 53. A system according to claim 52, wherein the route determination processor
comprises means for determining the recommended most economic route by
determining: a set of local decision nodes comprising a first local decision node, for
the origin point, and a second local decision node, for the destination point; and a set
of network decision nodes comprising a first network decision node, for the origin
10 point, and a second network decision node, for the destination point;
wherein the set of local decision nodes corresponds to links on the second
network, and the set of network decision nodes corresponds to key transportation
links on the second network;
and wherein the origin point and destination point are specified with reference
15 to geographical boundaries on the first network.

54. A system according to claim 52, wherein the geographical boundaries comprise a
set of postcodes.

- 20 55. A system according to claim 52, wherein the recommended most economic route
minimises a journey distance between the origin point and the destination point.

56. A system according to claim 52 or 55, wherein the recommended most economic
route minimises a journey time between the origin point and the destination point.

- 25 57. A system according to claim 52, wherein the recommended most economic route
minimises a journey cost between the origin point and the destination point.

58. A system according to claim 53, wherein the set of network decision nodes
30 comprises further network decision nodes in addition to the first and second network
decision nodes.

59. A system according to claim 53, wherein at least one of the origin point, the destination point, and a member of the set of local decision nodes is also a member of the set of network decision nodes.

5 60. A system according to claim 53, further comprising:

a route pre-determination processor for pre-determining at least a portion of a recommended most economic route between an origin point and a destination point;

a rapid access means in a digital storage means, for storing the pre-determined portion of the recommended most economic route; and

10 a user request processor for accessing the rapid access means for use in responding to a user request for traffic information for a journey between the origin point and the destination point.

61. A system according to claim 60, wherein the rapid access means comprises a
15 look-up table.

62. A system according to claim 40, 48, or 53, further comprising:

a real time data receiver for receiving real time data relating to real time vehicle location from a plurality of vehicle-bound probes; and

20 a matrix, in a digital storage means, relating vehicle speeds to at least a plurality of time of day divisions and a plurality of routes, based on the real time vehicle location data.

63. A system according to claim 62, wherein the plurality of vehicle-bound probes
25 includes at least one mobile telephone.

64. A system according to claim 62, further comprising:

a first matrix of recommended most economic routes, in a digital storage medium, relating a plurality of recommended most economic routes to at least a
30 plurality of time of day divisions, based on the matrix of vehicle speeds.

65. A system according to claim 64, wherein the first matrix of recommended most economic routes is based on the matrix of vehicle speeds with outlier vehicle speeds, and vehicle speeds related to unforecastable events, removed using statistical analysis.

66. A system according to claim 64, wherein the first matrix of recommended most economic routes comprises a plurality of route matrix elements, each route matrix element corresponding to a pairing of an origin point with a destination point, and
5 comprising: a route string, a shortest distance corresponding to the route string, a time corresponding to the route string, and a cost corresponding to the route string.

67. A system according to claim 66, wherein the route matrix elements further comprise entries for a plurality of possible vehicle types.

68. A system according to claim 66, further comprising means for determining each shortest distance string by:

determining a first distance between the origin point and the first local decision node;

15 determining a second distance between the first local decision node and the first network decision node;

determining a third distance between the first network decision node and the second network decision node;

20 determining a fourth distance between the second network decision node and the second local decision node;

determining a fifth distance between the second local decision node and the destination point; and

25 summing the first distance, the second distance, the third distance, the fourth distance, and the fifth distance to produce the shortest distance string.

69. A system according to claim 68, further comprising means for determining the third distance by summing a plurality of distances corresponding to distances between successive members of the set of network decision nodes, and wherein the set of network decision nodes comprises further network decision nodes in addition to the
30 first and second network decision nodes.

70. A system according to claim 64, further comprising:

a congestion scheduler for identifying, in real time, an area of traffic congestion between the origin point and the destination point; and

a matrix processor for determining an alternative, second matrix of recommend most economic routes based on the identified area of traffic congestion.

71. A system according to claim 70, wherein the congestion scheduler comprises
5 means for identifying the area of traffic congestion using both public domain data and non-public domain data.

72. A system according to claim 70, wherein the congestion scheduler comprises
10 means for identifying the area of traffic congestion using a database of traffic patterns.

73. A system according to claim 70, wherein the congestion scheduler comprises
means for identifying the area of traffic congestion by determining whether real time
vehicle location data from a plurality of vehicle-bound probes correspond to a pre-
determined level of variance from historic real time vehicle speeds.
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74. A system according to claim 70, further comprising a transmitter for transmitting
a message to a user identifying a cause of the area of traffic congestion.

75. A system according to claim 70, wherein the matrix processor comprises means
20 for determining the second recommended most economic route matrix by determining
a route having a shortest time between at least one pairing of origin point and
destination point.

76. A system according to claim 75, further comprising a forecast delay processor for
25 calculating a forecast delay by comparing the shortest time on the second
recommended most economic route matrix with a corresponding time from the first
recommended most economic route matrix.

77. A system according to claim 68, further comprising a traffic alert generator for
30 transmitting traffic alert information to a user in real time, the transmission
comprising at least one of: a traffic messaging channel on a radio data system; a
message to a mobile telephone; or a display of data over the Internet.

78. A method for providing traffic information for a journey, the method comprising:
performing time-dependent journey planning based on a plurality of
successive route sections each having an associated vehicle speed, wherein the vehicle
speed depends on the time of day at which it is predicted the route section will be
5 traversed on the journey.

79. A computer program product comprising program code means adapted to control
the method of claim 78.

10 80. A system for providing traffic information for a journey, the system comprising:
a route planning processor for performing time-dependent journey planning
based on a plurality of successive route sections each having an associated vehicle
speed, wherein the vehicle speed depends on the time of day at which it is predicted
the route section will be traversed on the journey.